Virginia Mercury Reduction Initiative

Pilot Mercury Collection & Thermometer Exchange

At 17 Virginia High Schools

Sponsored By:

Virginia Department of Environmental Quality
Virginia Department of Education

Summary

From May 22 to June 8, 2001, the Virginia DEQ collected elemental mercury and/or conducted mercury thermometer exchanges with ***17 Virginia high schools***. The 3-week "mercury sweep" resulted in the collection of approximately ***330 pounds of elemental mercury*** and nearly ***1900 thermometers***. In addition, DEQ distributed approximately 900 digital, mercury-free thermometers and distributed educational materials on the risks of mercury, where it is used, and what alternatives are available.

Foreword

Mercury is an element that as a pollutant is at or near the top of the EPA's lists of "PBT's", those elements which are the most "persistent, bioaccumulative, and toxic"; and therefore, pose the greatest risks to the environment and the public. As a result, the Virginia Department of Environmental Quality (DEQ) has worked to promote and coordinate statewide efforts to reduce the use of mercury and mercury-containing products; and to collect unused elemental mercury for proper management and recycling. Virginia's ***Mercury Reduction Initiative*** is part of ***Virginia Innovations in Pollution Prevention, or "VIP2"***, a series of programs and services designed to assist Virginia businesses in the implementation of pollution prevention activities.

The Mercury Reduction Initiative draws heavily upon the strengths of other successful mercury-related programs in other states and cities. The DEQ is utilizing existing partnerships with industry, state and local governments, and non-profit organizations to create new partnerships with state and federal government entities, the healthcare industry, local school systems, and other groups. (Attachment 1)

School Collection & Exchange

The Mercury Collection & Thermometer Exchange project is part of this initiative, and was conducted as a pilot. The overall purpose of the pilot was to gage the abundance of elemental mercury that currently ***exists as a potential health hazard*** in Virginia schools. However, an equally important goal of the pilot, which is critical to any pollution prevention effort, is ***education***: educating school personnel, students, and parents about the risks/dangers of mercury; making them aware of the types of equipment and devices that contain mercury; and encouraging these audiences to purchase non-mercury containing devices and equipment in the future.

The schedule and results of the project are attached (Attachments 2a-b). However, the project also resulted in several other benefits:

- Provided efficient and proper handling of mercury and mercury containing devices, ***saving the school systems thousand of dollars*** in handling and potential cleanup fees and liabilities.
- Provided an "extra bonus" for colleges & universities and businesses that are involved in other voluntary P2 initiatives by allowing them to participate in the collection.
- Created partnerships between state agencies and local governments that can be utilized in future mercury reduction efforts and projects.
- Created interest among corporate partners, the pharmacy and healthcare industries, and other groups in possibly continuing and expanding collection and exchange efforts in the future.

The Project

After initial discussions with DEQ, the Department of Education's Delores Dalton sent a letter and survey to all Virginia high schools (Attachment 3). Approximately 45 high schools responded to the survey indicating their interest in participating in a mercury collection. DEQ's Office of Pollution Prevention (OPP) received the surveys in late April, 2001; and after discussions with the Department of Education, embarked upon the pilot project with an ambitious goal of completing an initial collection by the end of the school year. OPP's Jennifer Comfort was assigned project leader for the project.

DEQ's OPP contacted all 45 of the responding high schools to afford them the opportunity to participate in the collection. The time frame was limited, and many schools had conflicts related to exams and other events; however, 17 high schools were able to participate.

Preparation & Safety

DEQ's Office of Pollution Prevention (OPP) was asked to coordinate all aspects of the "mercury sweep" project. DEQ staff researched other mercury collection efforts, such as a recent collection by the Virginia Dental Association and the Virginia Health Department, and the thermometer exchanges that were performed in Washington DC by the non-profit "Healthcare Without Harm". OPP researched and developed a series of fact sheets and educational resources related to mercury's toxic characteristics and other attributes. OPP staff worked with the DEQ Safety Officer, Jim Saunders, to develop safety protocol, training, and guidance in accordance with existing OSHA (Occupational Safety & Health Administration) standards for all DEQ staff involved in the collection / exchange activities. In addition, Jack Tolbert of the Department of Emergency Management reviewed the procedures and trained OPP personnel in the use of mercury detection equipment (Draegger pumps).

Because mercury is a potentially toxic element and because of the liabilities involved with a possible spill on school property, the emphasis of the safety training and protocol was to err on the side of caution. Extra precautions, such as requiring double-bagging of all mercury vessels, covering work areas in plastic, and protective eye- and hand-wear were taken; and the protocol assigned specific responsibilities to minimize the possibility of accidents. (Attachments 4a-b)

Regulations

OPP coordinated with DEQ's Waste Program to outline the specifics of the proposed mercury collection and recycling program. Since the collected mercury and mercury-containing devices are being recycled as a "material", it is considered to be "universal waste" and not subject to RCRA regulations. DEQ contracted with Bethlehem Apparatus to recycle the material. The material was transported as a hazardous material by a certified carrier, Conway Southern Express.

DEQ Regional Staff Involvement

The 17 collection sites were distributed around the State, with 6 of the 7 DEQ regions having at least 2 participating schools (Valley Regional Office had none). As such, OPP asked the regional directors for volunteers to assist in the collection events and to help notify local authorities about the event. Regional staff was asked to notify the local Fire, Police, Health, and Safety officials. The following regional staffpersons assisted in the project:

SWRO – Willard Keene

WCRO – Lewis Pillis & Grady DelVilbis
SCRO – Frank Bowman & Kyle Winter
PRO – John Conover & Mo Habibi
TRO – Ron Pinkoski
NRO – Patty Greek

Educational Resources

In addition to the collection "table", where mercury and thermometers were collected, there was an educational resources table at each event. The resource table was where participants received their digital thermometers and brochures and fact sheets concerning mercury and associated DEQ and pollution prevention programs. (Attachments 5)

Results

Fourteen 3-hour mercury collection and thermometer exchange events were held, and DEQ personnel "picked up" mercury and thermometers at 3 other school locations. Each of the events was different – approximately half were conducted as expected with traffic from parents and the community. In some cases, the events were announced in the local paper or even covered by television news crews. At two sites, the DEQ staffpersons were invited in to talk to classes about mercury. At certain sites, attendance was sparse, possibly due to the relative level of promotion or poor communication of what was being collected and exchanged was not well communicated. However, at all host sites, the schools were very happy to have DEQ come and to take unwanted mercury and mercury-containing items "off their hands".

Costs

The main expenses for the mercury sweep can be attributed to the processing of the mercury and thermometers and the purchase of digital thermometers. DEQ contracted with Bethlehem Apparatus of Pennsylvania to process and recycle the collected mercury. Originally, DEQ conservatively ordered 5, 5-gallon containers to ship the collected materials. The collected materials filled these containers and a 55-gallon drum, and were shipped as a universal waste by a hazardous materials handler, Conway Southern Express. In addition, various pieces of mercury-containing equipment, such as barometers, manometers, and large thermometers were collected, and there was no additional room for any of these in the original shipment. Therefore, these items are being packed in an additional 55-gallon drum that will be shipped separately. For the purposes of pricing efficiency, DEQ will solicit its own regional operations for additional mercury and mercury-containing equipment; and that drum will be shipped as soon as it is full.

Digital Thermometers	1000 @ $2.75 =	$ 2750
Mercury Recycling		
▪ 5 buckets		$ 1350
▪ 1 drum		$ 1175
Shipping		$ 700
Materials		$ 500
TOTAL		$ 7,475
Plus Additional Drum & Shipping		$ 1500
		$ 8,975

Additional Considerations & Prospects

Because of the time frame, there was little time for DEQ to partner with other organizations on this pilot project. There are, however, many affiliated groups and organizations with which DEQ should establish partnerships for any additional mercury-related projects.

DEQ staff communicated with several pharmacy chains to see if they were interested in co-sponsoring the thermometer exchanges by donating the digital thermometers. Several corporate representatives were very interested in the concept, but the events occurred too quickly to gain approval for this type of transaction. However, the potential for this sort of partnership is very favorable for future events. In addition, DEQ staff has had discussion with one healthcare service chain that is very interested in sponsoring thermometer collection sites at all of their facilities.

Many of the corporate partners and colleges also expressed interest in hosting events; and additional high schools have already expressed interest. The Department of the Defense P2 Partnership has expressed interest in sponsoring some sort of mercury reduction project as well. Virginia colleges and universities participated in several of the collections, and there is interest in hosting similar events. Hospitals, in association with DEQ's upcoming healthcare initiative, are another prospect for future partnerships; and there has been interest in working with building associations regarding the collection and use of mercury-containing devices.

More Lessons Learned

- Effective and repeated communications and additional coordination time would ensure that all events are successful.
- Additional agencies, such as the Department of Emergency Management and the Department of Labor & Industry, should be notified and involved in the planning process early.
- The pilot involved a significant amount of labor by DEQ's OPP staff (in excess of 400 man-hours).
- Although no incidents occurred, safety should be emphasized at all additional events.
- Although regulatory questions were properly addressed, the issues of liability and risk for DEQ, DEQ staff, and host sites should be thoroughly discussed and documented.
- The Central Office facility is not well-suited for the storage and handling of mercury-containing drums or other vessels. Future collections should utilize more suitable storage and loading facilities. In addition, guidance for shipping hazardous materials should be developed.

Next Steps

DEQ has successfully completed this pilot project, and it is very apparent that there is significant interest in continuing this type of mercury outreach effort and collection service. The pilot provided a great service to schools, and it afforded an excellent opportunity to increase the public's awareness about mercury, mercury-containing products, and other DEQ programs.

Given the results of the pilot, DEQ plans to implement the following steps:

- Report: Summarize the findings of the Mercury Collection & Thermometer Exchange and make it available to interested groups.

- Package: Develop a "package" that would be made available to all groups interested in hosting similar events. All affected agencies should be notified that such a package is being developed and that other groups might be hosting such events. DEQ will assist interested groups in coordinating details and hosting such events. Ongoing discussions with pharmacies and

healthcare facilities will be continued to potentially help defray costs of disposal/recycling and thermometers.

- Possible Partnerships & Statewide Collection Program: DEQ will work with other interested organizations such as pharmacies, healthcare providers, builders associations, corporate partners and associations, colleges & universities, federal (DoD) facilities, and state agencies. Depending upon the interest of other groups, DEQ may form partnerships and pursue additional projects in support of the larger Mercury Reduction Initiative. (One such idea is applying for funding of a mobile mercury collection unit)

Overall Recommendations

The pilot project was a major undertaking for an OPP staff that is already responsible for a myriad of other programs and initiatives. However, judging from the public's reception, the project was an overwhelming success; and the project has great potential to foster additional corporate, non-profit, and government partnerships. Additional events and / or projects could significantly increase name recognition of DEQ and awareness of DEQ programs and efforts. In addition, such a statewide campaign would significantly increase the public's awareness of the dangers of mercury and the availability of non-mercury containing alternatives. A statewide initiative would require at least one additional staffperson, perhaps on a contractual basis.

Additional Thanks

This project could not have been successful without the hard work of OPP staffperson ***Jennifer Comfort***, the project leader, and the other OPP staffpersons who served as "in-charges" at the collection events: Keith Boisvert, Kim Easter, Benji Brackman, and Tom Griffin . Many other DEQ personnel were involved in one way or another to facilitate this project. Thanks to:

Harry Augustine	George Walker	Pat Vanderland
Tom Jennings	Jerry Conrad	Peggy Hawkins
Ann Regn	Lisa Tortorella	Carol Lampkin
Bill Stagg	Steve Frazier	

In addition, thanks to Dupont deNemours for the donation of the 55-gallon drums.

Virginia's Mercury Reduction Initiative

The Virginia Department of Environmental Quality's Office of Pollution Prevention is working to promote and coordinate statewide efforts to reduce the use of mercury and mercury-containing products; and to collect unused elemental mercury for proper management and recycling. Virginia's initiative will draw heavily upon the strengths of other successful mercury-related programs in other states and cities. In furthering this initiative, Virginia plans to utilize existing partnerships with industry mentors, state and local government, and the dental industry; and to create new partnerships within federal government, the hospital and pharmaceuticals industry, and local school systems.

Dental Mercury Sweep

The Virginia Dental Association (VDA) has worked with the Virginia Department of Health (VDH) to coordinate a system of collection sites for dental offices that have antiquated supplies of elemental mercury. The VDA contracted with a mercury recycler to collect the mercury at 22 VDH collection sites. The collection was held from April 1 – May 31, 2000, resulting in the collection of more than 400 pounds of mercury.

Schools Sweep

Virginia is working with the Virginia Department of Education on a pilot project to collect elemental mercury at up to 40 high schools. The collections are currently being scheduled for late May and early June. In addition, DEQ is collecting mercury-containing thermometers and is providing free digital thermometers in exchange. In addition, the sweep has an educational goal and will provide information materials on the dangers of mercury and the types of equipment that contain mercury. The collected mercury will be processed by a contracted mercury recycler. DEQ is trying to interest Virginia pharmaceutical companies to sponsor additional collections/thermometer exchanges next year.

Healthcare P2 Challenge

Because of the prevalence of hospital waste incinerators, the healthcare industry is actually one of the largest contributors of mercury to the environment. This statistic can be related by risk factors to a significant number of deaths each year, and is in stark contrast to the overall mission of the healthcare industry. For this reason, in 1998, the American Healthcare Association entered into a Memorandum of Understanding with the Environmental Protection Agency that specified, along with various other waste-related pledges, a commitment to eliminate all mercury-containing devices by the year 2005.

Virginia has worked with the Washington DC Council of Governments and its partners in the development of the "P2 pledge" program that has been developed for DC-area hospitals to embrace the terms of the EPQ MOU. The Virginia DEQ is utilizing these same partners to develop a similar program and to promote a comprehensive P2 project with the healthcare industry. DEQ is in the process of developing a core group of hospitals to serve as a charter committee that would champion the initiative and help DEQ tailor its pledge program to the

needs of Virginia healthcare facilities. DEQ has received funding for a healthcare consultant that will perform a limited number of free, P2/mercury audits for Virginia hospitals. DEQ envisions a high-level ceremony for the signing of the Virginia pledge sometime in late Fall 2001 with continuing recognition of achievements thereafter.

Department of Defense Sweep

In the Fall of 2000, Virginia and 22 Department of Defense (DoD) facilities entered a partnership agreement dedicated to P2 and environmental achievement. The *DoD Pollution Prevention Charter* commits to work together with the Virginia DEQ in furthering P2 projects and the development of Environmental Management Systems at DoD facilties. One of the work tasks being considered by the partnership is a mercury reduction initiative sweep onDoD facilities that would be coordinated with other state efforts.

State Agency P2 Planning & the Virginia College & University P2 Challenge

In 1995, *House Joint Resolution 453* was passed by the Virginia General Assembly requesting state agencies to development "pollution prevention plans". Since that time, the VADEQ has been working with the 44 state agencies, including all state colleges and universities, all of whom have P2 Plans in place.

In the Spring of 2001, the Secretary of Natural Resources, John PaulWoodley, Jr., issued the *Virginia College & University P2 Challenge*, asking both public and private institutions of higher learning to pledge to serve as models of environmental stewardship; and to work together to share information and achieve environmental progress.

As a follow-up to the pilot high school mercury sweep and thermometer exchange, DEQ will ask participating colleges and universities, both public and private, to consider sponsoring similar events.

For more information, contact:

Jennifer Comfort
Virginia Department of Environmental Quality
Office of Pollution Prevention
POBox 10009
Richmond, Virginia 23240-0009
804-698-4235; FAX 804-698-4264
Email: jkcomfort@deq.state.va.us

Mercury Sweep & Thermometer Exchange

St. Paul High School
St. Paul
May 22
3:00pm - 6:00pm
Terry Vencil
540-762-0221
Tom & Jen
SWRO - Willard Keene
Jack Tolbert, DEM

Virginia High School
Bristol
May 23
7:00am - 10:00am
Myra Orr
540-645-9650
Tom & Jen
SWRO - Willard Keene
Jack Tolbert, DEM

Salem High School
Salem
May 23
3:00pm - 6:00pm
Margie Secor
540-387-2437
Tom & Jen
WCRO-Grady Devilbis & Lewis

Jefferson Forest High School
Forest
May 24
7:00am - 10:00am
Larry Mays
804-525-2674
Tom & Jen
WCRO-Grady Devilbis & Lewis

Arcadia High School
Oak Hill
May 29
3:00pm - 6:00pm
Carol Gray
757-824-5613
Kim & Jen
TRO – Ron & Lisa?

Hampton High School
Hampton
May 30
7:00am - 10:00am
Betty Long
757-825-4430
Kim & Jen
TRO – Ron & Lisa?

Gloucester High School
Gloucester
May 30
3:00pm - 6:00pm
Mark Westfall
804-693-7549
Jen & Kim
PRO-John Conover & Mo Habibi

Governor's School for Global Economics & Technology
Keysville
June 1
7:00am - 10:00am
Deborah Hamilton
Tom & Keith
SCRO-Frank Bowman

Amelia High School
Amelia
June 1
9:30am - Pick-up only
Barbara Harris
804-561-2101
Jen

Governor's School for Global Economics & Technology
Alberta
June 1
1:30pm - 4:30pm
Celeste Paynter
804-949-0068
Tom & Keith
PRO-John Conover & Mo Habibi

Wakefield High School
Arlington
June 4
7:00am - 10:00am
Tom Croger
703-228-6700
Tom/Keith & Benji
NRO?
DEMS-Kevin Fannin 703-228-4657

Liberty High School
Bealeton
June 4
3:00pm - 6:00pm
Cindy Wall
540-439-6300 ext. 287
Tom/Keith & Benji
NRO?
DEMS-Phillip Meyer 540-347-6995

Lord Botetourt High School
Daleville
June 6
3:00pm - 6:00pm
Mary Wimmer
540-992-1261
Jen & Keith
WCRO-Lewis

Governor's School for Global Economics & Technology
Danville
June 7
2:00pm - 5:00pm
N. Finney
804-791-5223
Jen
SCRO-Frank Bowman

Park View High School
Mecklenburg
June 8
7:00am - 10:00am
Diane Layne
804-447-3435
Jen
SCRO-Kyle Winter

- Pick-ups also include Patrick Henry High School in Washington County and Giles High School and Narrows High School in Giles County.

DEQ Contact Information
Jennifer Comfort
Jkcomfort@deq.state.va.us
804-698-4235

Mercury Collection Results

High School	Location	# of Thermometers		Elemental Mercury (in pounds)
		large (~3 grams)	small (~.5 grams)	
St. Paul	St. Paul	145	70	2.31
Virginia	Bristol	0	3	2.75
Salem	Salem	233	32	5.81
Jefferson Forest	Forest	128	75	20.75
Arcadia	Oak Hill	22	7	43
Hampton	Hampton	160	107	87.25
Gloucester	Gloucester	3	87	4.75
* GSGET	Keysville	11	20	3.36
GSGET	Alberta	45	0	13.31
GSGET	Danville	18	17	3.96
Amelia	Amelia	5	11	0
Wakefield	Arlington	154	10	12.25
Liberty	Bealeton	117	37	6.63
Lord Botetourt	Daleville	115	55	64.19
** Patrick Henry	Glade Spring	3	0	0
** Giles County		101	0	2.63

* Governor's School for Global Economics & Technology
** Pick-up only

TOTAL:	***1260***	***531***	***272.95***
TOTAL POUNDS:	***8.32***	***0.58***	***272.95***

OTHER HG-CONTAINING DEVICES:

Barometers	6 * 1.5lbs = ***9 lbs***
XL Thermometers	5 * 0.5lb = ***2.5lbs***
Manometers	12 * 1.5lbs = ***18lbs***
Air Satellite Office	***18lbs***
TOTAL:	***47.5lbs***

GRAND TOTAL MERCURY COLLECTED: 329.35 pounds

COMMONWEALTH of VIRGINIA

DEPARTMENT OF EDUCATION

P.O. BOX 2120

RICHMOND 23218-2120

February 6, 2001

TO: High School Science Department Chair

FROM: DHP Delores Dalton, Science Specialist

There are three items of importance that I need to bring to your attention.

1. National Youth Science Camp. A separate memo with accompanying information is enclosed.

2. Physics Teacher Survey. The Virginia Instructors of Physics is attempting to gather data on the state of physics instruction in Virginia. Please complete the enclosed survey and return it to my office by March 9.

3. Mercury Removal. The Department of Environmental Quality is prepared to organize a free, regional pick up of mercury stored in schools. This will probably take place in late spring. If you are interested in participating in this program, please fill out the form below and return it to my office by March 9.

Name of School Division Accomack County Arcadia High School

Contact Name Carol A Gray

Phone Number (757) 824-5613 e-mail cgray@ahs.accomack.k12.va.us

Thanks for your help. Please call (804-371-0778) or e-mail (ddalton@mail.vak12ed.edu) if you have questions about any of the above.

Procedure for Mercury Collection & Thermometer Exchange

Staff:

1 or 2 DEQ "In-Charges"
1 DEQ Regional Office Volunteer
1 School Representative
(All staff must read and sign the mercury safety sheet)

Location:

To be determined by the host School; must be inside, away from student traffic, and accessible to cars. The floors ***cannot be carpeted***. The school must provide ***2 oblong tables and chairs*** for the staff.

Notifications:

1. The ***DEQ regional staff volunteer*** is responsible for notifying the local police, fire, health, and OSHA officials. The Directors of the Dept of Health & the Dept of Emergency Management were contacted by a letter from Dennis Treacy. Local county/city managers were contacted by Harry Gregori.
2. The ***School volunteer*** is responsible for notifying the parents of its students. If the school would like to coordinate with other nearby schools for collection of their elemental mercury, DEQ does not object. However, we encourage coordination / transfer of the mercury prior to the collection date.
3. DEQ will issue (1) one blanket ***press release*** regarding the overall pilot mercury collection and thermometer exchange program. If individual schools would like to publicize their events, that is up to them. For a copy of the press release or if your local media plans to cover the event, we ask that you contact DEQ's Bill Hayden at 804-698-4447 or wphayden@deq.state.vs.us.

Set-Up:

Set-up will begin at least 45 minutes prior to beginning of the collection.

1. Plastic sheeting (approximately 10 feet by 10 feet) will be taped down to cover the entire work space. Plastic sheeting will also be placed over the mercury work-table.
2. 1 of the tables will be designated for ***mercury and thermometer collection*** and will be labeled with appropriate signage (DEQ). This table will have the collection unit / bucket and the thermometer collection container (rubbermaid). There will be a sign-in sheet for both collections. The only other equipment at this table will be a digital scale for weighing elemental mercury & extra ziplcok bags.
3. The other table will designated for giving out new digital thermometers and educational materials (DEQ signage as well).
4. The ***school volunteer*** should assist in preparing sufficient signage to direct persons attending the collection.
5. All vials of mercury collected by the school prior to the event should be double-bagged and transferred to the collection bucket prior to the event time.

Operation:

1. ***Collection of elemental mercury*** will take place at 1 designated mercury table. The collection bucket will be handled only by one of the DEQ "in-charge" personnel, and the "in-charge" will wear protective glasses, apron, and gloves whenever handling elemental

mercury. A trashbag liner will be placed in the bucket. Any elemental mercury that is brought in will also be placed into a ziplock bag. All elemental mercury samples will be weighed, and the provider must provide personal information on the sign-in sheet. When not in use, the lid of the collection bucket will be in place.

2. ***Collection of mercury-containing thermometers*** will take place at the other end of the mercury table. Staff will take mercury thermometers, which should already be in ziplock bags, and place them into a lined, thermometer collection container (rubbermaid). The bucket will also be prepared with bubble wrap to minimize the possibility of broken thermometers. Protective eye-wear and gloves are optional. There will be a sign-in sheet only to indicate the number of thermometers that are being collected. Names will not be necessary.
3. ***New Digital Thermometers*** and ***educational materials*** will be given out at the other table (this table does not have to be covered in plastic). There will also be a ***sign-up sheet f***or anyone interested in DEQ programs and/or receiving the newsletter, *Pollution Prevention Virginia*.
4. ***Attendance*** at the event should be estimated, and the number of thermometers given out should be tracked.

If a Spill Occurs or a Thermometer Breaks:

1. The DEQ ***"in-charge***" person is the lead authority on dealing with the incident.
2. The ***"in-charge"*** will isolate and deal with the material appropriately; the ***school volunteer*** will be asked to assist in asking other persons to vacate the area.
3. Recovered materials should be double-bagged and placed into the collection bucket.
4. After appropriately "cleaning" the spill area, the "in-charge" will utilize a Draegger pump and mercur vapor tubes to take a reading, and the reading will be observed by other event staff and documented.
5. Dept of Emergency Management staff will be present at certain sites. DEQ "in-charges" will defer to the DEM staff in those cases.
6. Seriousness of Spill
   - If the spill / thermometer breakage lands only ***on the plastic sheeting and it is a "small" area***; the mercury can be isolated, and the sheeting can simply be cut out, bagged, and placed into the collection bucket.
   - If the spill / thermometer breakage occurs ***off of the plastic sheeting and it is just a small area;*** the mercury should be isolated, the "mercury magnet powder" from the spill kit should be used to minimize vapors, and recovered as well as possible; however, a Draegger pump reading should be taken, AND the DEM should be notified, if not already on site.
   - If the ***spill is large and / or off the plastic sheeting*** the mercury should be isolated and the mercury magnet powder used, AND the DEM should be called immediately to assist in the recovery.

Break-Down

1. DEQ staff will secure the mercury collection bucket and weigh / estimate its volume/weight on the "bathroom" scale. This weight and the number of thermometers exchanged / collected should be marked on the collection sign-in sheet for each location.
2. As appropriate, DEQ staff will transfer thermometers to the collection bucket; and the buckets will be secured properly in the state vehicle. Safety glasses, protective covering, and gloves should be worn during this process. Staff should take extra precautions to secure / tie down all materials and equipment to guard against accidental spills / breakages.

3. Event staff can then assist in breaking down the tables and disposing of plastic sheeting and other materials.
4. If no spills / breaks occurred, the plastic sheeting can be folded up and used again.
5. DEQ staff will travel to the next collection site.
6. The collected mercury and thermometers can be left in the van overnight – however, collected thermometers should not be left in the van if it is "too" warm. In-charge staff should make every effort to park the vehicle in a shaded area if this is the case. Otherwise, thermometers should be brought into the new collection site or some other secure area.
7. If this is the end of a trip, the staff will transfer the collection buckets and thermometers to a suitable storage area. The storage unit in the basement by the mailroom (environmental education and coastal materials) is lockable, and the in-charges will have the key.

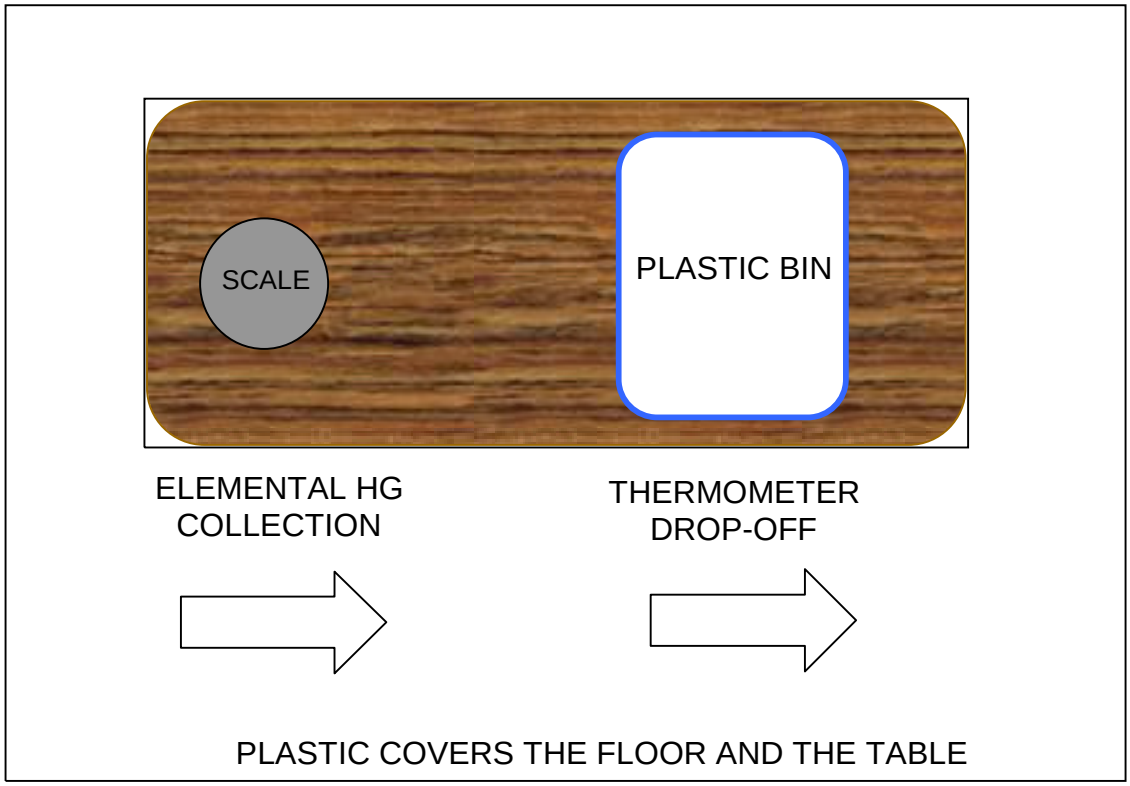
Checklist of Mercury Items

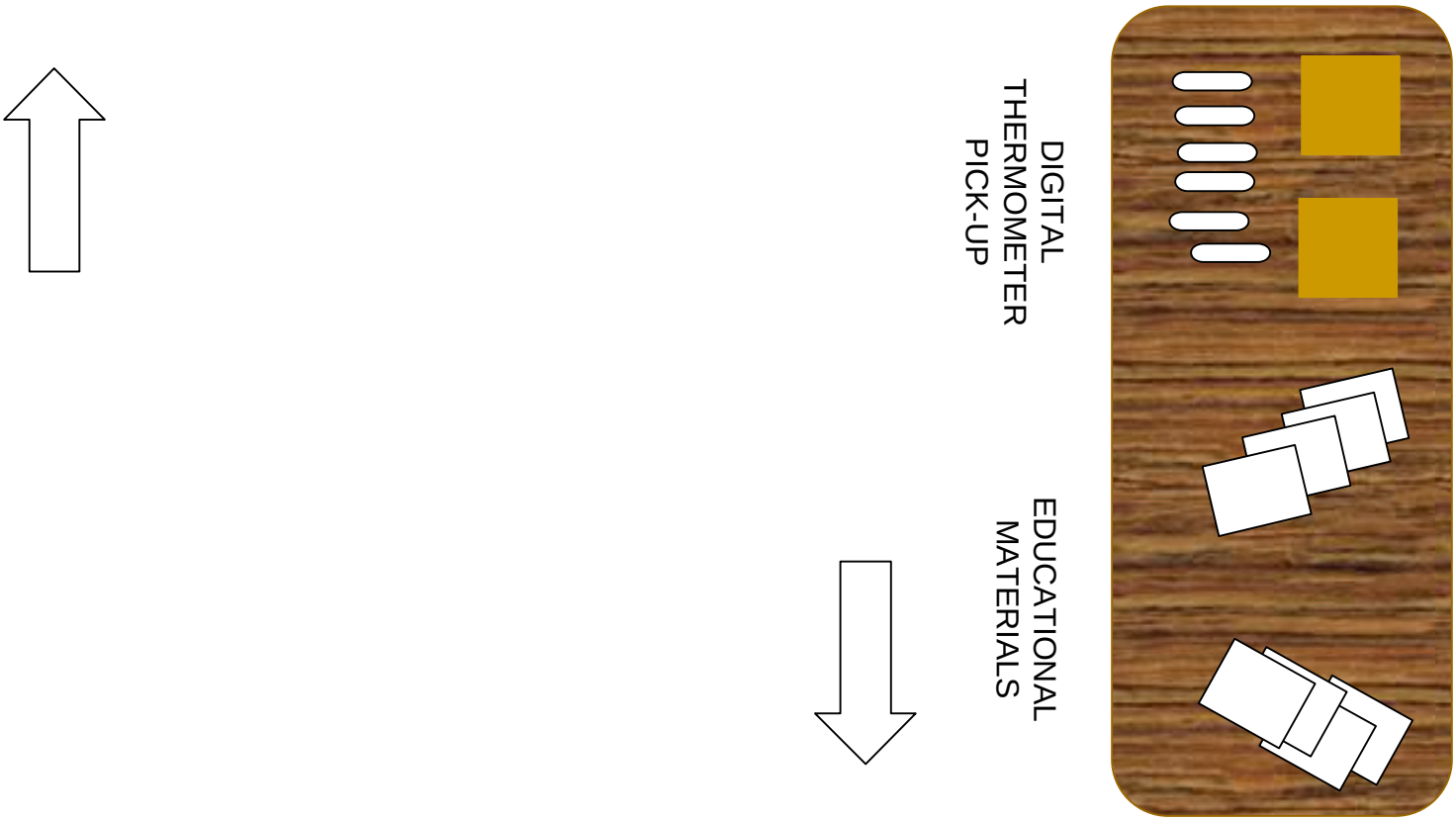
5 Collection Buckets
3 Spill Kits
Thermometer Collection Containerss
Latex Gloves (to be worn during collection)
Bubble Wrap (for thermometer collection & final packaging for shipping)
Plastic Sheeting
Safety Glasses (to be worn by event staff)
Tyvek Coveralls (5)
Masking Tape / Electrical Tape
Log-In / Sign Up for Mailings
Glass Eye Droppers
Zip-lock Bags
Trashbags
DEQ Sign
Brochures

- Thermometers
- Healthcare Without Harm
- Fact Sheets
- P2 brochures
- Mercury Reduction Initiative
- Virginia Naturally
- Mercury Fact Sheets

Phones – P2 issue
Shirts
Educational Materials

DIAGRAM OF MERCURY COLLECTION SITES





Mercury is All Around Us!

Everyday Items Which Contain Mercury

Although mercury can be very harmful to the environment when it is handled or disposed of improperly, it does have many beneficial uses. People are gradually becoming more aware of the dangers of mercury; however, most of us don't even realize that mercury is contained or used in so many products – and often times, these items are disposed of as regular solid wastes. In certain areas or in the case of medical waste incinerators, these items are incinerated with other wastes, resulting in direct dispersion of mercury to the environment.

Here are some examples of where mercury is used:

- ***Mercury Thermometers*** - Typical fever thermometers contain about ***0.5 grams*** of mercury. Laboratory thermometers contain up to ***3 grams***.
- ***Mercury Containing Thermostats*** - All non-electronic thermostats, contain ***3 grams*** of mercury in each tilt switch and may have up to ***6 switches***.
- ***Mercury in Cars*** - Many switches used in cars are mercury activated.
- ***Silent Wall Switches*** -These devices look like typical wall switches, contain ***2 grams*** of mercury and operate on the principal of liquid mercury in a metal encased glass button that completes the electrical circuit when the switch is lifted up.
- ***Mercury Containing Switches*** - A mercury tilt switch may be used in thermostats, silent light switches, clothes washer lids, and chest freezers. A mercury containing electrical switch may contain ***3.5 grams*** of mercury.
- ***Fluorescent Lamps*** - Contain less than ***10 milligrams*** to ***50 milligrams*** per tube.
- ***High Intensity Discharge Lamps*** - Anywhere from ***20*** to ***250 milligram****s* of mercury are found in the average HID lamp.
- ***Flame Sensors*** - Gas-fired appliances that have pilot lights, like ***ranges, ovens, clothes dryers, water heaters, furnaces, and space heaters*** use mercury-containing flame sensors.
- ***Freezers*** - Some chest freezers with an internal light have a mercury switch incorporated in the light socket. Around 190,000 freezers with this type were sold in the U.S.
- ***Manometers and Barometers*** - Equipment that measure air pressures using mercury gauges.
- ***Sump Pumps and Septic Tanks*** - Sump Pumps and Septic tanks often contain float control switches to turn the equipment on and off when the water is at a certain level.
- ***Elemental Mercury and Compounds*** - Container labeled as mercury or with the periodic symbol 'Hg', may be found in a ***dentist's office, laboratory, industrial business*** or used for ***ceremonial purposes*** by certain religions or tribes.
- ***Rubber Floors*** - 3M Brand Tartan Track, or ***flooring*** installed during the early 1970s contained a mercury catalyst and was installed in ***gymnasiums***. Other rubber tracks or sports surfaces used in gyms may have contained mercury as well.
- ***Commercial/Industrial Heating & Cooling Equipment*** - Be aware of mercury containing switches within the heating or cooling unit.
- ***Sphygmomanometers*** - measure blood pressure and may house pounds of mercury.
- ***Nasal Spray and Contact Lens Solution*** - Some, older, types of ***nasal spray*** and ***contact solution*** use preservatives (thimerosal, phenylmecuric acetate and phenylmecuric nitrate) that contain mercury.

- ***Mercurochrome*** - An antiseptic containing mercury.
- ***Chemistry Sets*** - Often contain mercury compounds.
- ***Alkaline Batteries*** - Older batteries, bought before 1990 may contain mercury.
- ***Button batteries***- Button batteries in older toys that light up or in watches, may have a mercury component.
- ***Shoes that light up*** - Illuminated shoes made before 1994 used mercury as a switch.
- ***Maze Toys*** - Older maze toys may contain mercury as part of the toy.

For all of these materials, mercury-free alternatives are now available. In many cases, it is not economically feasible to replace all mercury-containing items, right away. However, we can make a point to purchase mercury-free products in the future when the old ones wear out; AND we should make special provisions to ensure that mercury and mercury-containing devices are recycled or disposed of properly.

For more information on locating, disposal and alternatives to mercury containing components in the home, please go to:

http://pasture.ecn.purdue.edu/~mercury/src/devicepage.htm
http://www.on.ec.gc.ca/glimr/classroom/millennium/mercury/mercury-chart-e.html

or contact:

Jennifer Comfort
VA DEQ Office of Pollution Prevention
POBox 10009
Richmond, VA 23240-0009
804-698-4545, FAX x4264
jkcomfort@deq.state.va.us

The Truth about Mercury Thermometers

What is the problem with mercury fever thermometers?

Very small amounts of mercury can do significant damage. One gram of mercury per year is enough to contaminate all the fish in a lake with surface area of 20 acres. A typical mercury thermometer contains approximately 0.7 grams of mercury (700 milligrams), but larger thermometers can contain as much as three grams. Both short term and long term exposure to mercury can cause serious health problems for humans and wildlife.

How toxic is mercury?

Mercury is highly toxic. Mercury affects the nervous system and can impair the way we hear, talk, see, walk, feel and think. Humans are exposed to mercury through contaminated air, water or food or directly through the skin. In fact, long before we had scientific facts to prove mercury's toxicity, there was evidence that mercury poisoning resulted in nerve damage. In the 1800's hat makers were exposed to mercury during the wool felting process. The strange and unpredictable behavior of Lewis Carroll's "Mad Hatter" in *Alice of Wonderland* was a portrayal of hat makers who had gone "mad" from mercury poisoning.

Does one broken fever thermometer really pose a health risk to the consumer?

Yes, it can if not cleaned up properly. In 1998, there were 18,000 phone calls to poison control centers about broken mercury thermometers. When a mercury thermometer breaks, the liquid silver metal spills onto the floor or carpet. Breaking one fever thermometer is unlikely to threaten the health of the consumer and proper cleanup of spilled mercury can minimize the risks even further. However, if the consumer fails to clean up mercury either because he or she is unaware that it has broken or because it is difficult to gain access to the mercury (for instance because it has seeped through a carpet), then the mercury will eventually be evaporated into the air and reach dangerous levels in indoor air. The risks increase if the consumer attempts to clean up a mercury spill with a vacuum cleaner, or if the mercury is heated for some reason. The danger of significant mercury exposure is greatest in a small, poorly ventilated room.

Actual Case Studies*

- In one case, exposure resulted when 1.1 grams of mercury from a broken fever thermometer were collected and placed in a pan that was laid on a hot kitchen stove. As a result, the mercury vaporized quickly. Two elderly patients developed severe pulmonary edema, diarrhea, confusion, tremors, and coma, and died after 7 and 17 days of hospitalization. A third patient developed a skin rash that cleared up after 3 weeks.

- Another case involved a 32 month-old girl who was afflicted by hypertension, irregular heartbeat, apathy, irritability, excessive sweating and acrodynia as the result of exposure to mercury spilled from a broken thermometer onto carpet. Three months of treatment were required before her condition improved.

- In yet another case, three children, ranging in ages from 20 months to six years old, were exposed to mercury from a thermometer that had been spilled on a carpet. They developed symptoms including loss of appetite and weight loss; sensitivity to light; pink, sweating, and scaling palms; eczema and itching. The two more severely affected children required four months of therapy before complete recovery.

Do fever thermometers really contain enough mercury to affect the environment?

Yes. If you dispose of a mercury thermometer in your regular garbage and that trash is burned in an incinerator, mercury vapors will be released into the air. Mercury from landfilled garbage can seep into groundwater or can be released into the air as a toxic vapor. Airborne mercury eventually falls to earth, often into rivers and lakes,Where microorganisms transform the mercury into an even more highly toxic form called methylmercury. Methylmercury builds up in aquatic animals, including fish. It accumulates in muscle tissue, and so, unlike

some other pollutants, it cannot be trimmed away when cooking the fish. Mercury poses the greatest threat to people who eat large amounts, and to fetuses whose mothers eat a lot of fish, because mercury can cross the placental barrier and affect the developing nervous system.

While the amount of mercury in an individual thermometer may seem small, the total amount contained in thermometers is significant. The United States Environmental Protection Agency considers mercury thermometers as the largest source of mercury to the solid waste stream, estimated at 17 tons per year. Clearly, thermometers are a meaningful source of mercury to the environment that can be easily reduced by switching to non-mercury thermometers.

What happens if a mercury fever thermometer breaks in a child's mouth?

It is also common for children to break fever thermometers in their mouths. Mercury that is swallowed in such cases poses low risk in comparison with the risk of breathing mercury vapor. The mercury passes through the body and is minimally absorbed, but then it enters the waste water system and can reach the environment.

What are the alternatives to mercury thermometers?

Several types of non-mercury thermometers are available commercially. These include:

- ☑ Digital electronic thermometers
- ☑ Glass gallium-indium-tin (galinstan) thermometer
- ☑ Flexible forehead and ear canal thermometers

Are non-mercury fever thermometers adequate diagnostic tools?

A recent statement by the American Medical Association indicated that they are.

What are the risks that an alternative thermometer could poison the user?

There is no known or anticipated risk.

What are the environmental consequences of non-mercury thermometers?

The known environmental damages caused by alternative thermometers are significantly less than those presented by mercury thermometers. The primary environmental concern arising from use of alternative thermometers relates to the disposal of button cell batteries used in digital electronic or ear canal thermometers. Button cell batteries used in digital thermometers contain significantly less mercury than a mercury thermometer--roughly 3.5 to 11 milligrams of mercury per battery.

When a mercury thermometer or a button cell battery is thrown away and enters an incinerator, much of the mercury that it contains is likely to be emitted to the atmosphere. However, a mercury thermometer that breaks in the home, or that breaks in the solid waste system prior to burial in a landfill, will release significantly more of its mercury than will a button cell battery.

Mercury Thermometers and Your Family's Health

Healing the Home

Health Care Without Harm

Health Care Without Harm, the Campaign for Environmentally Responsible Health Care, is producing and distributing this publication. Health Care Without Harm is an international campaign with over 300 participating organizations focused on transforming the health care industry so it is no longer a source of environmental harm by eliminating pollution in health care practices. The campaign is working with hospitals and other health care institutions to phase out the use of mercury and other toxic pollutants in health care products and practices.

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Mercury at School
Where to Look and What to Look For

Electrical And Heating Equipment

Check for: thermostats, "silent" light switches and recycling of fluorescent light bulbs

Why?: Thermostats are used to control the temperature in buildings. Approximately 80% of thermostats in use today contain mercury. Many "silent" light switches contain mercury. Each fluorescent tube in overhead lighting fixtures contains a minute amount of mercury. However, your school probably uses a large number of these fluorescent bulbs throughout the building, so the total amount of mercury can be significant.

Alternatives: Electronic thermostats and non-mercury switches are widely available. Fluorescent bulbs should be recycled, rather than thrown out.

Who to Talk to: School engineering or janitorial staff

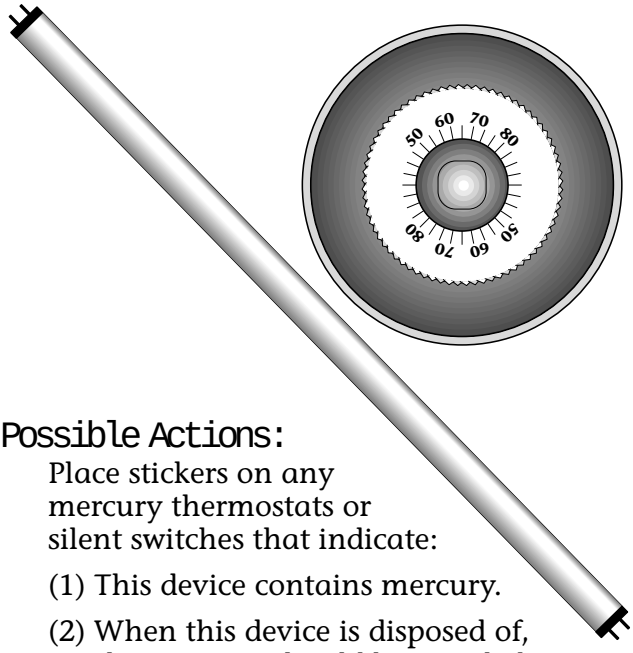
Questions to Ask:

(1) How many thermostats and "silent" light switches are there in your school building?

(2) How many of these contain mercury?

(3) How are used fluorescent bulbs managed? Are they recycled or thrown out in the trash?

(4) If they are recycled, how and where are they stored before they are taken from the building for recycling?



Possible Actions:

Place stickers on any mercury thermostats or silent switches that indicate:

(1) This device contains mercury.

(2) When this device is disposed of, the mercury should be recycled.

(3) When purchasing a replacement, a mercury-free model should be chosen.

Honeywell Corp. has a free take-back program for used mercury thermostats. Call 1-800-345-6770 for more information.

Notify the purchasing department to try to get mercury-free thermostats or light switches when purchasing replacements.

Your school should recycle used fluorescent bulbs by replacing them in their original box in a safe, secure storage area until they are picked up by a recycling contractor.

Mercury at School
Where to Look and What to Look For

Nurse's Office

Check for: thermometers, blood pressure measuring device (sphygmomanometer), nasal spray and contact lens solution

Why?: Mercury thermometers are used to check for fever.

Sphygmomanometers can contain up to several pounds of mercury.

Nasal spray and contact lens solution may contain thimerosal (an ingredient that has mercury in it), phenylmercuric acetate or phenylmercuric nitrate.

Alternatives: Alcohol or electronic thermometers are readily available.

Aneroid blood pressure devices are just as effective as the mercury versions.

Many brands of nasal spray and contact lens solution do not contain mercury.

Who to Talk to: School Nurse

Questions to Ask:

(1) How many mercury thermometers are in the nurse's office?

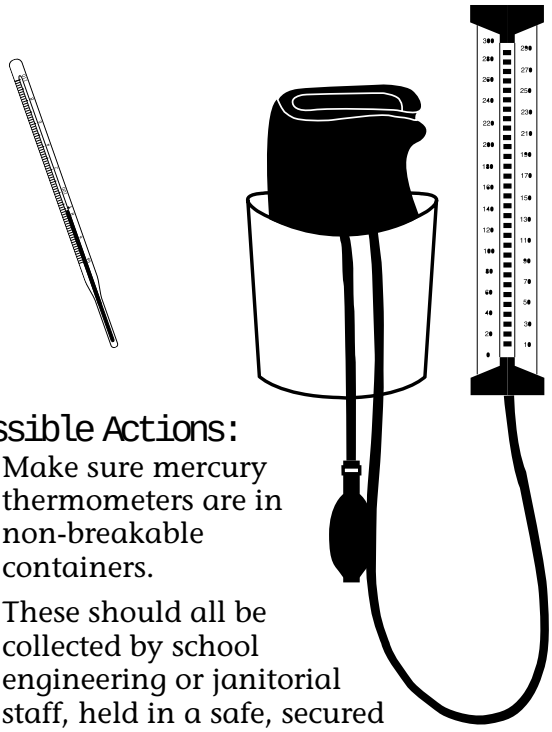
(2) Have you ever experienced a broken thermometer?

(3) Is a spill kit readily available, if a spill occurs?

(4) Are you familiar with the proper spill control procedures for mercury?

(5) Do you use a sphygmomanometer? If yes, have you considered replacing it with an aneroid blood pressure device that does not contain mercury?

(6) Do you stock nasal spray or contact lens solution? If yes, have you checked the list of ingredients or contacted the manufacturer to make sure they do not contain mercury?



Possible Actions:

Make sure mercury thermometers are in non-breakable containers.

These should all be collected by school engineering or janitorial staff, held in a safe, secured area prior to recycling them.

Do not wait for mercury thermometers to break before replacing them with alcohol or electronic alternatives.

Replace sphygmomanometers with aneroid blood pressure devices.

If mercury thermometers or sphygmomanometers will not be replaced at this time, obtain a spill kit for the nurse's office. Make sure that the nurse(s) are trained in proper spill control procedures.

Use up existing stock of nasal spray or contact lens solution containing mercury and then purchase mercury-free alternatives.

Mercury at School
Where to Look and What to Look For

Science And Chemistry Class Rooms

Check for: pure mercury, mercury compounds, thermometers

Why?: Mercury and mercury compounds were used in various experiments. They may or may not be used now, but they may still be in the cabinet or closet. Mercury thermometers may be used in science, chemistry, biology and physics classes.

Alternatives: Other chemicals can be used in class experiments to illustrate science or chemistry principles. Alcohol or electronic thermometers are readily available and sufficiently accurate.

Who to Talk to: Chemistry and other science teachers

Questions to Ask:

(1) Are mercury or mercury compounds currently used in class?

(2) If they are being used, could other chemicals replace them?

(3) Do you know if these have been used in the past in science classes in this school?

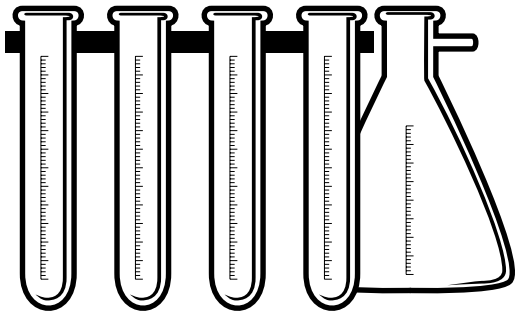
(4) Are these being stored in a closet, cabinet or elsewhere?

(5) How many mercury thermometers are in the class room?

Have you ever experienced a spill of mercury or a broken thermometer in your class room?

(7) Is a spill kit readily available, if a spill occurs?

(8) Are you familiar with the proper spill control procedures for mercury?



Possible Actions: Make sure any mercury, mercury compounds or thermometers are in non-breakable containers. These should all be collected by school engineering and/or janitorial staff, held in a safe, secured area prior to recycling them.

Your school should not wait for mercury thermometers to break before replacing them with non-mercury alternatives. If mercury thermometers will not be replaced at this time, obtain spill kits for the science class rooms and storage rooms. Make sure that at least several staff people are trained in proper spill control procedures.